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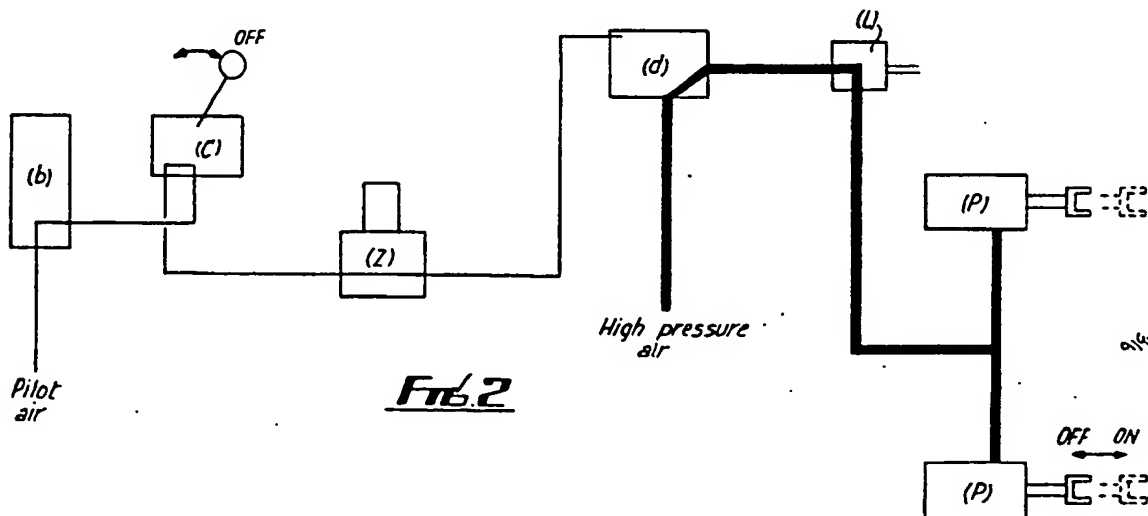
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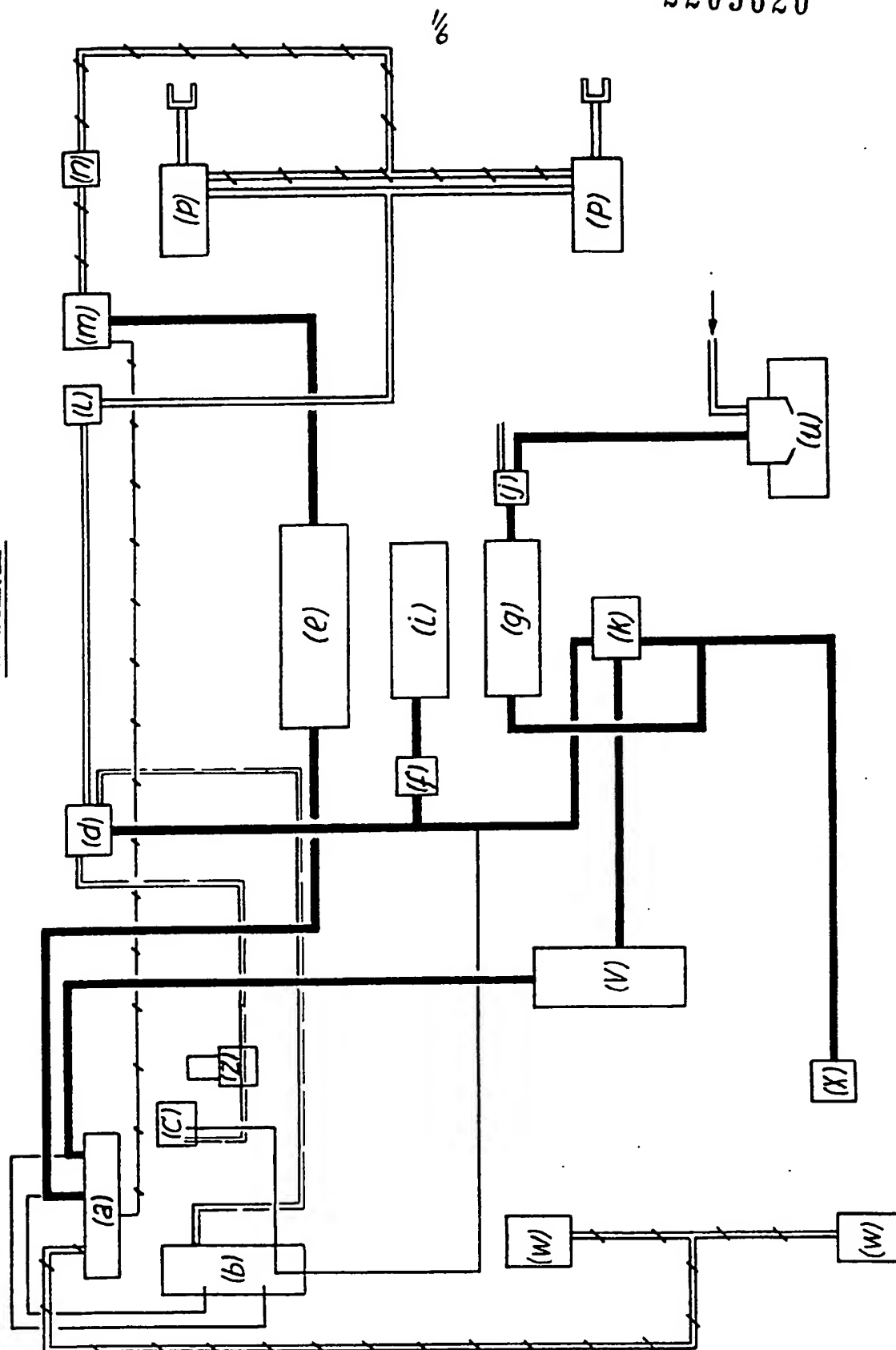
(54) Lockable vehicle parking brake

(57) A vehicle parking brake circuit, comprises spring brake actuators *p* for applying the vehicle brakes, a reservoir for the supply of high pressure air, a relay valve *d*, for permitting flow of air from the supply to release the brake actuators and pilot control means for controlling the relay valve *d* and hence the actuators *p*. The control means comprise a hand brake control *c* connected through a pilot airline and lockable security valve *z* to relay valve *d*. When control *c* is operated pilot air is supplied to relay valve *d* to thereby apply the brake providing security valve *z* is in the correct open position. Valve *z* may be operated with a coded key. This arrangement enables security to be provided for the brake without draining the main air supply.




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FIG. 1





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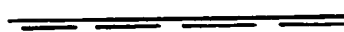
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 Air pressure - supply & store

 Parking brake circuit

 Service brake circuit

 Pilot air to valves, relays

 Pilot air (Park brake)

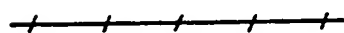
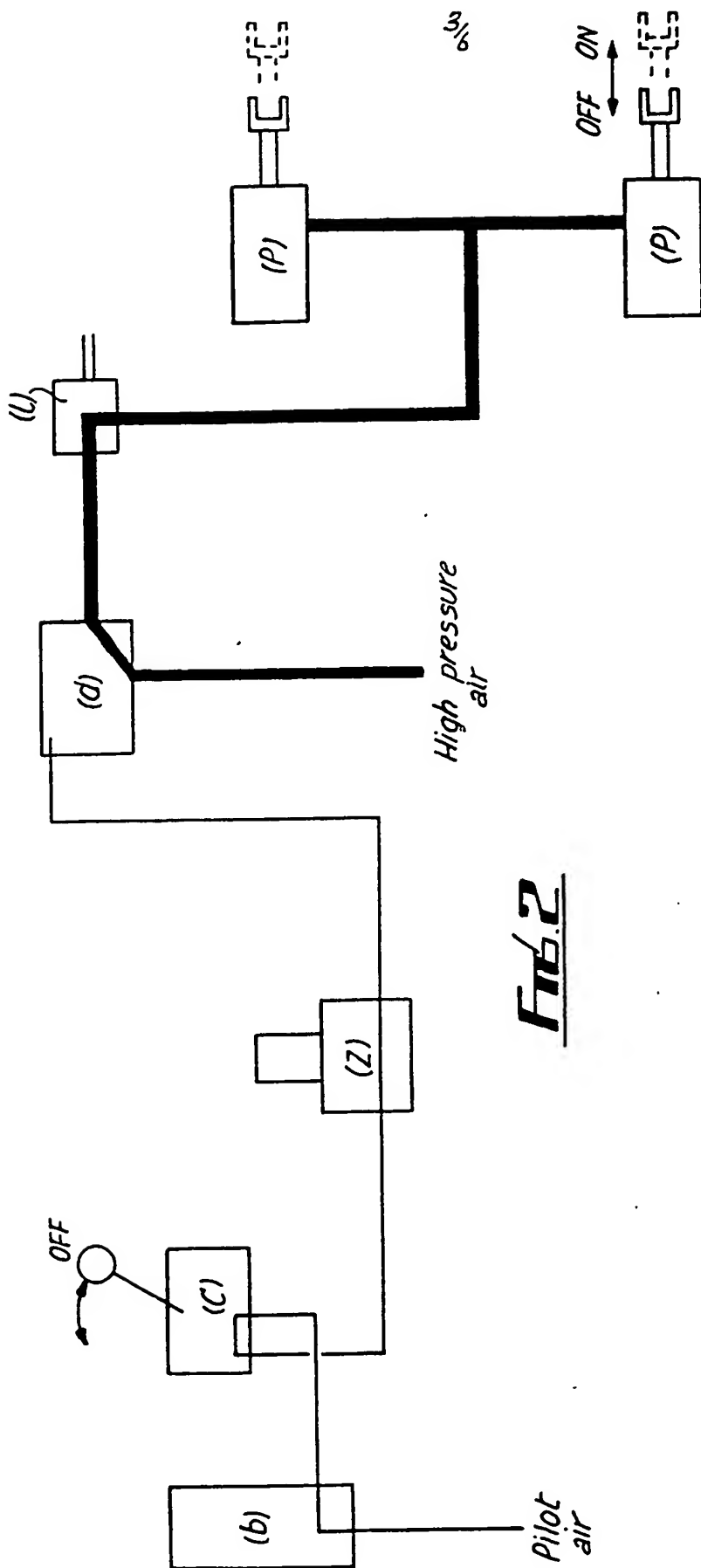
 Pilot air (Service brake)

Fig. 1a



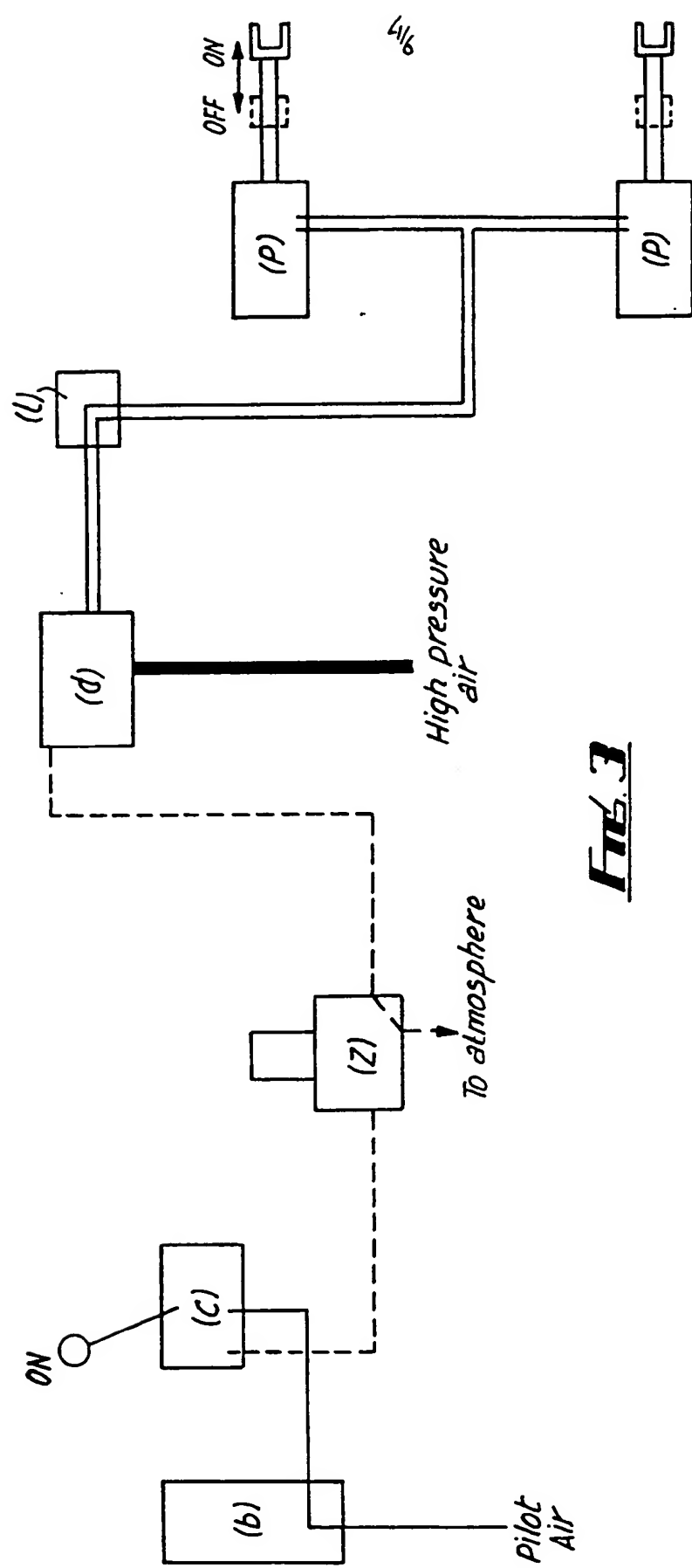


FIG. 3

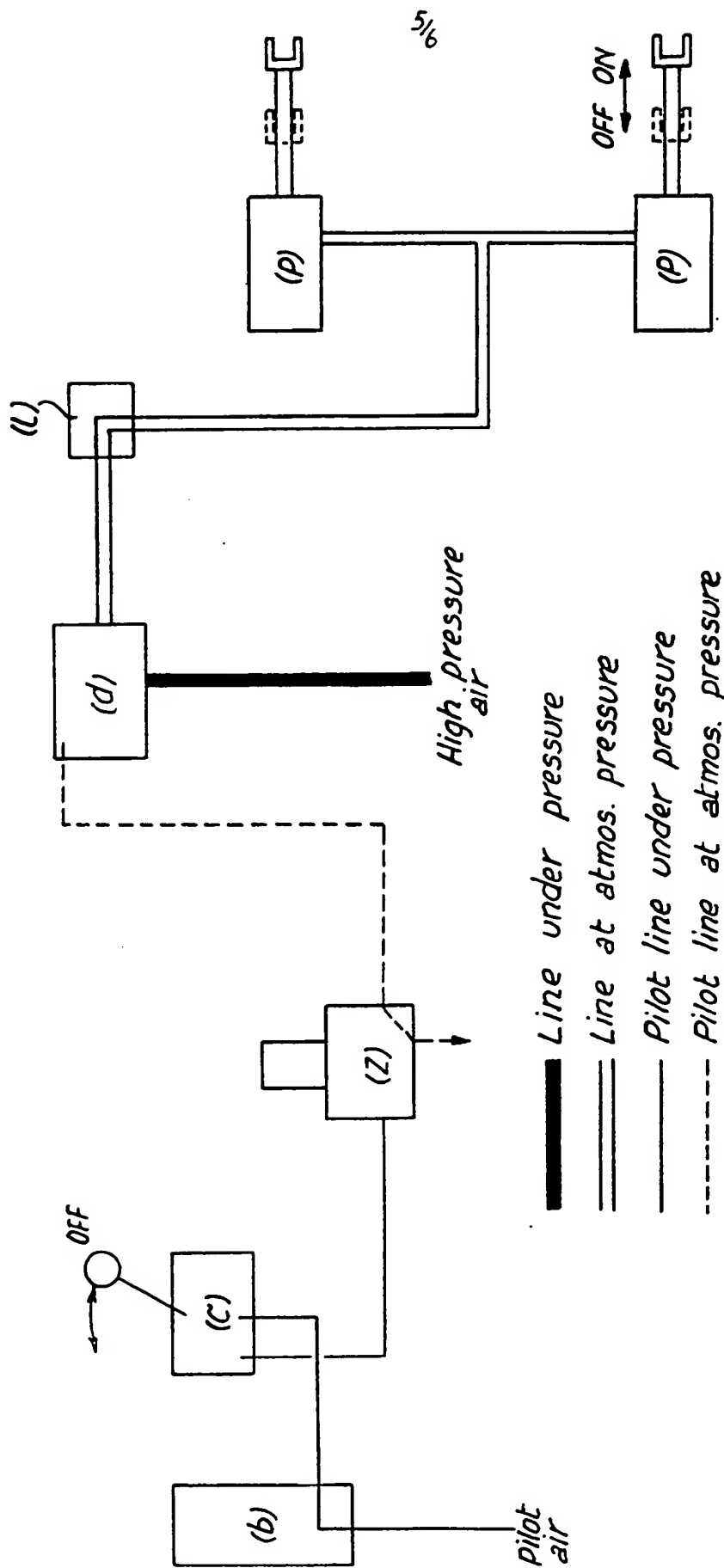
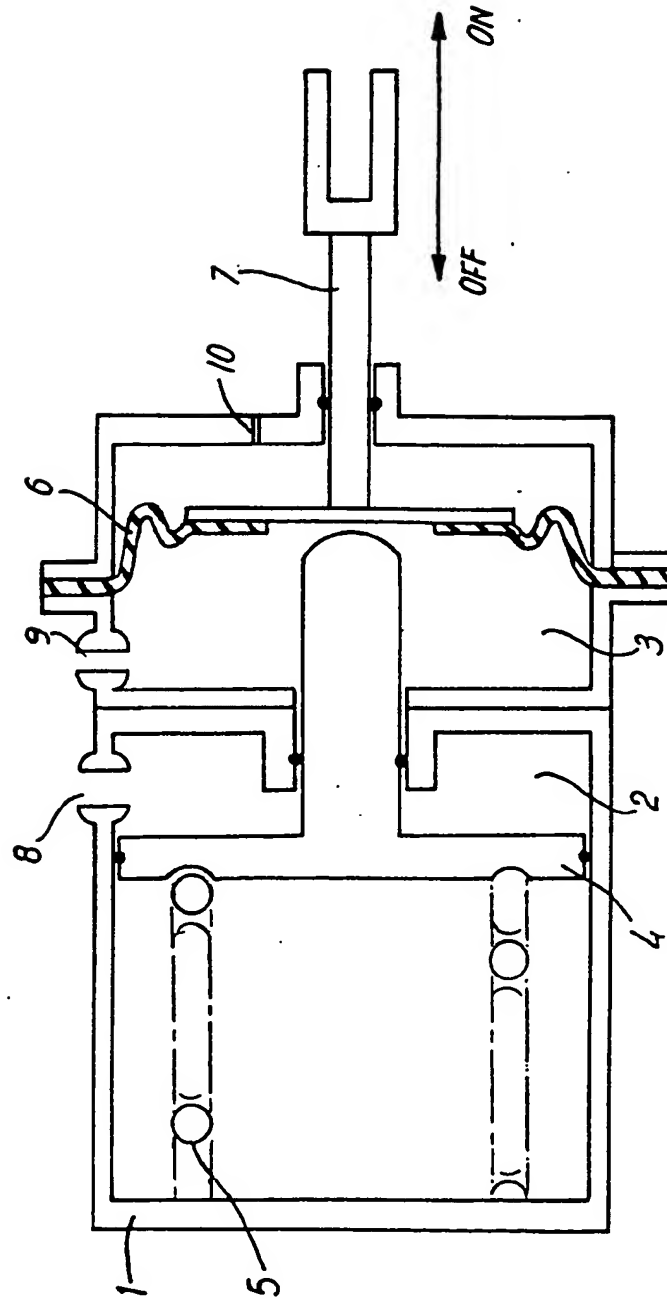


Fig. 9

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A VEHICLE BRAKING SYSTEM

The present invention relates to a vehicle braking system.

At the present time heavy vehicle braking systems are compressed air actuated. On those vehicle wheels where the hand or parking brake operates, spring brake actuators are provided. These have a dual function. In the vehicle parked mode, they operate under spring pressure to apply the brakes to the corresponding wheels. In the vehicle driving mode, compressed air holds the brakes off against the action of the spring pressure and applies the brakes to slow the vehicle under driver control when required.

It is necessary to deactivate the parking brake before the vehicle can be moved. By restricting access to the operation of the parking brake, vehicle theft can be inhibited.

According to the present invention there is provided, a pressure fluid operable vehicle braking system comprising an actuator for applying a parking brake to a wheel of the vehicle a reservoir for the supply of pressure fluid, a valve for permitting the flow of fluid from the reservoir to the actuator, and control means for controlling the operation of the valve comprising a lockable security

valve, the arrangement being such that in operation, on unlocking the security valve, the control means open the valve to permit pressure fluid flow to the actuator to release the parking brake.

5 In a preferred embodiment of the invention, the control means comprise a pilot fluid line controlling operation of the valve disposed between reservoir and actuator. The lockable security valve is disposed in this pilot fluid line. In the inoperative position, the security valve
10 connects the pilot fluid line to atmosphere and the valve does not permit fluid flow from reservoir to actuator. In the operative position pilot fluid pressure is supplied to the valve via the security valve and the valve opens to supply pressure fluid to the actuator to release the brake.
15 The preferred pressure fluid is compressed air.

The security valve is preferably key operated. The key may advantageously be a coded electronic key. Such a key is described in the Applicants copending U.K. Patent Application No. 8626719.

20 In order that the invention may be more clearly understood, one embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 diagrammatically shows an overall vehicle

braking system to which the present invention has been applied,

Figure 1a shows the key for Figure 1,

5 Figure 2 diagrammatically shows a section of the system of Figure 1 relating to the parking brake with that brake in an off position,

Figure 3 diagrammatically shows the section of Figure 2 but with the brake in an on position,

10 Figure 4 diagrammatically shows the section of Figures 2 and 3 in an on position with the parking brake circuit partially activated but with the parking brake off, and

Figure 5 shows a spring brake activator for the system of Figure 1.

15 Referring to Figure 1, the system comprises two front brake actuators w and two rear brake actuators p which are operated by means of compressed air fed from a front surface brake reservoir v and a rear surface reservoir e. The key to the various pressure lines interconnecting the
20 components of the braking system is shown in Figure 1A and indicates the purpose for which the various pressure lines are used. The foot brake valve is indicated at a and the

hand brake control at c. These controls are connected to air pressure switches represented by block b. Hand brake control c is connected via a pilot airline through a security valve z, a relay valve d and a differential valve 5 l to the rear brake actuators p. When air is supplied via the pilot line to the relay valve d, that valve opens to permit compressed air to be fed to actuators p. Other parts of the system are identified as follows:-

- f - test connection,
- 10 g - sensing reservoir,
- j - unloader valve,
- k - multi-system protector,
- m - relay valve rear surface brake,
- n - load sensing valve, and
- 15 z - external charge coupling.

Apart from the application and operation of that part of the circuit containing the security valve z, the operation of the system is conventional.

Referring to Figures 2, 3 and 4 that part of the 20 system of Figure 1 which controls the parking brake is shown. The parking brake operates on the rear wheels of the vehicle through brake actuators p. One of these actuators is shown in more detail in Figure 5. It comprises a housing 1 comprising two chambers 2 and 3 25 through which a piston 4 loaded by a compression spring 5

extends. A diaphragm 6 extends across chamber 3 and to this diaphragm is connected a brake actuator 7. To put the brake on, the actuator is pushed to the right and to take the brake off to the left. Two compressed air supply
5 ports 8 and 9 lead into chambers 2 and 3 respectively. When air is supplied through port 8, the piston 4 is pushed back against compression spring 5 enabling the brake to move to the off position. During normal operation, supply of air to chamber 3 pushes the actuator
10 7 through diaphragm 6 to the right to put the brakes on. Any air to the right of the diaphragm 6 is vented via vent 10. To operate the hand or parking brake, air from the chamber 2 to the right of piston 4 is vented from the chamber thus enabling piston 4 to move to the right under
15 the action of spring 5 to actuate actuator 7 to put the brakes on.

Figure 2 of the drawings shows the parking brake in the off position with high pressure air supplied to the right hand side of the piston 4 through port 8 thus
20 pressing the piston back against spring 5 and releasing actuator 7. In this operational position, pilot air is permitted to pass through the security valve z to the relay valve d which in turn enables high pressure air to be fed to the ports 8 of the actuators p. Referring to Figure 3,
25 when the parking brake is on, the security valve z prevents transmission of pilot air to the relay valve d and vents this pilot air to atmosphere. Relay valve d is then

deactivated and in turn prevents the supply of high pressure air to the ports 8 of the brake actuators p with the result that the brakes are then put on by the spring loaded piston 4 acting on the actuator 7.

5 The security valve 2 may be operated by means of a coded key which in turn may be used to control other functions of the vehicle. By incorporating this security valve in the pilot line, the disadvantage of security systems in which the high pressure air reservoirs are
10 drained is avoided. Also, a lack of security associated with such systems is similarly avoided. It is not possible with the above described system to overcome the system by using an alternative high pressure supply of air simply because whatever supply is provided, it will not be passed
15 by the relay valve d unless this valve is actuated by the security valve 2.

 It will be appreciated that the above embodiments have been described by way of example only and that many variations are possible without departing from the
20 invention.

CLAIMS

1. A pressure fluid operable vehicle braking system comprising an actuator for applying a parking brake to a wheel of the vehicle a reservoir for the supply of pressure fluid, a valve for permitting the flow of fluid
5 from the reservoir to the actuator, control means for controlling the operation of the valve comprising a lockable security valve, the arrangement being such that in operation, on unlocking the security valve, the control means open the valve to permit pressure fluid flow to the
10 actuator to release the parking brake.
2. A pressure fluid operable vehicle braking system as claimed in claim 1, in which the control means comprise a pilot fluid line controlling operation of the valve
15 disposed between reservoir and actuator.
3. A pressure fluid operable vehicle braking system as claimed in claim 2, in which the lockable security valve is disposed in the pilot fluid line.
20
4. A pressure fluid operable vehicle braking system as claimed in claim 2 or 3, in which the security valve, in its inoperative position, connects the pilot fluid line to atmosphere and the valve does not permit fluid flow from
25 reservoir to actuator.

5. A pressure fluid operable vehicle braking system as claimed in claim 2,3 or 4, in which the security valve, in its operative position, permits the supply of pilot fluid pressure to the valve, the valve opening to supply pressure fluid to the actuator to release the brake.

6. A pressure fluid operable vehicle braking system as claimed in any preceding claim, in which the security valve is key operated.

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7. A pressure fluid operable vehicle braking system as claimed in claim 6, in which the security valve is operated by a coded electronic key.

15 8. A pressure fluid operable vehicle braking system substantially as hereinbefore described with reference to the accompanying drawings.

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